The level of lactate dehydrogenase and ferritin in the blood of Covid-19 patients compared to healthy people in Iraq

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ABSTRACT

60 samples were collected, 40 samples were for patients with CO-19 and 20 samples were for healthy control people. Tests were performed to know the patients people through the ADVIA Chemistry XPT System and an analysis was performed to find out the ratio of ferritin to patients based on I CHORMA. As for the LDH analysis, use the Cedex Bio Analyzer to find results were found that showed the great effect on ferritin and LDH, where the ratio of standard deviation to LDH to patients people was 441.5641 ± 234.80 and for control 185.08 ± 35.26 as for the analysis of ferritin, where the ratio of standard deviation was 853.92 ± 516.13 to patients people and for control 88.48 ± 59.44 And through the work of statistical analysis to know the effect of the CO-19 on the abnormal ratio, as the statistical analysis proved that there is a positive effect on ferritin and LDH to patients people and the control has a negative effect, and this explains the reason for the lack of the amount of iron present in the body is little if the person is a carrier of the disease

Keywords: CO-19, LDH, FR, SARS, Hb

1. INTRODUCTION

CO-19 viruses are a group of viruses that can cause diseases such as the common cold, severe acute respiratory syndrome (SARS), and Middle East respiratory syndrome .A new type of CO-19 was discovered after it was identified as a cause of the spread of a disease that began in China in 2019. The virus is now known as severe acute respiratory syndrome CO-19virus 2 (SARS Cove 2) [1, 2]. The resulting disease is called CO-19virus Disease 2019 (Covid 19). In March 2020, the World Health Organization announced that it had classified CO-19virus disease 2019 (Covid 19) as a pandemic [3]. Public health groups, such as the Centers for Disease Control and Prevention in the United States (CDC) and the World Health Organization (WHO), may show signs and symptoms of Covid 19 two to 14 days after exposure [4]. The period following exposure and preceding the onset of symptoms is called the "incubation period" and other less common symptoms have been reported, such as skin rash, nausea, vomiting, and diarrhea [5]. Children usually develop symptoms similar to adults, and their illness is generally mild and the severity of COVID-19 symptoms can range from very mild to severe [6]. Some people may develop only a few symptoms, and some people may not have any symptoms at all. Some people may experience a worsening of symptoms, such as worsening shortness of breath and worsening pneumonia, about a week after symptoms begin. Older people are at a higher risk of developing serious COVID-19 symptoms, and that risk increases as a person gets older [7]. People with existing chronic medical conditions may be more likely to have severe symptoms According to the World Health Organization, there may be limited human-to-human transmission of this virus within patients' families, and largescale disease outbreaks may occur [8]. On January 20, 2020, a case of human-to-human transmission was documented in Guangdong, China, and a persistent cough means a prolonged and frequent cough for more than an hour, or three or more coughing episodes within 24 hours, but if you usually suffer from a cough, the situation may be worse usually.

It also leads to shortness of breath, which is often described as severe chest tightness, difficulty breathing or a feeling of suffocation [9]. The patient feels a fever if his temperature exceeds 37.8 degrees Celsius, as this leads to a feeling of warmth, cold or shivering, and it takes an average of five days until symptoms begin to appear, but some people contract it at a later time and the World Health Organization says that the incubation period for the virus reaches Up to 14 days [10]. A recent study published by a British medical journal indicated that 78 percent of people infected with CO-19virus (Covid-19) show mild or no symptoms ("without symptoms", according to the medical designation). The results of the study are consistent with research conducted in an Italian village that is the epicenter of the outbreak, and it was found that 50 percent to 75 percent of the infected people are without symptoms, but they are a "major source" of infection. The death rate from HIV infection appeared to be low (between one percent to 2 percent), but these numbers may be unreliable and inaccurate due to the lack of reporting many cases [11]. Thousands of people are undergoing treatment for HIV infection, but some may die from infection with it, so the death rate may become higher, and it may also become lower if it is known that a large number of moderate cases have not been

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reported. People can catch COVID-19 from other people who have the virus [12]. The disease is spread mainly from person to person through small droplets that a person with Covid-19 secretes from their nose or mouth when they cough, sneeze or speak These droplets are of relatively heavy weight, as they do not move to a faraway place, but rather fall quickly to the ground[13]. People can contract Covid-19 disease if they breathe in these droplets from a person who has the virus infection Therefore it is important to keep a distance of at least 1 meter (3 feet) from others [14]. These droplets may land on objects and surfaces surrounding a person, such as tables, doorknobs and stair railings People can then become infected when they touch these objects or surfaces and then touch their eyes, nose, or mouth. Therefore, it is important to wash hands frequently with soap and water, or to clean them with an alcohol-based hand rub disinfectant. Covid-19 infection is spread mainly through respiratory droplets secreted by a person who is coughing or has other symptoms such as fever or fatigue [15]. But many people with Covid-19 infection show only very mild symptoms and this is especially true in the early stages of the disease and it can actually catch the infection from someone who has a mild cough and does not feel patient [16].

2. MATERIAL AND METHOD

60 samples were collected to test the effect of CO-19 on ferritin and LDH, consisting of 40 samples for patients and 20 samples that were controlled by relying on a device automation –ready ADVIA Chemistry XPT System



Figure 1 ADVIA Chemistry XPT system

After knowing the people infected with CO-19, the necessary analyzes are performed on them to know the percentage of ferritin and LDH present in the blood, where the knowledge of the ferritin percentage is analyzed by drawing $30\,\mu l$ through a pipette, then we put the entire amount in a cup of ferritin and shake 10 times, then a microliter is withdrawn from the mixture and put in The cartridge is then transferred to the incubator, then the cartridge is removed and placed in the I CHORMA



Figure 2 I CHORMA

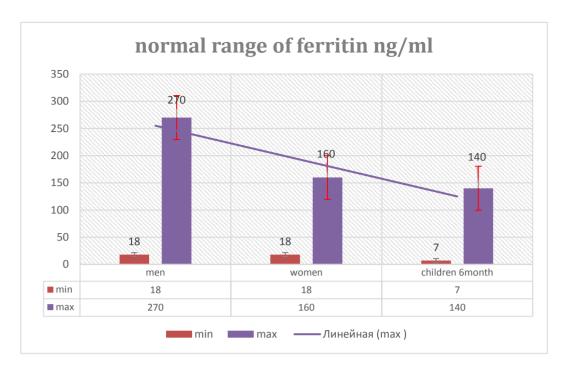


Figure 3 normal range of ferritin

After that, the LDH test is performed by preserving the blood samples cooled to prevent the change of blood components, and a detergent substance can be added to keep the samples for a longer time [17]. The tubes in which the blood is collected and kept at the temperature of the sample until it is transferred to the laboratory and used device Cedex Bio Analyzer to find results



Figure 4 cedex Bio analyzer

3. RESULTS

Table 1.1 explain result of Ferritin and LDH

age gender		LDH(135-225) U/L	FR(22-322) ng/ml		
55	M	750	1650		
30	M	638	886		
30	F	360	176		
60	M	500	1211		
55	F	370	980		
55	M	200	625		
60	F	380	1650		
66	M	182	1600		
56	M	750	1666		
60	M	300	500		

64	F	315	688
63		617	999
	M		
50	F	341	255
64	M	188	733
39	M	750	410
40	F	308	367
66	M	755	1446
44	M	479	997
75	M	260	1650
75	F	600	472
52	F	363	734
54	M	750	1173
65	M	1240	1650
79	M	320	930
65	F	273	1043
44	F	473	225
40	M	584	1650
60	F	188	325
43	M	347	890
30	M	509	305
38	F	261	141
43	F	120	532
50	F	512	306
74	M	675	1600
63	M	617	999
55	M	300	809
48	M	160	231
70	F	353	678
30	F	133	121

Table 1.2 explain result of control

_			Table 1.2 explain result of co			
p	g	age	FR	LDH		
P1	M	49	70	178		
P2	M	44	33	200		
P3	M	66	67.7	231		
P4	F	57	34	190		
P5	M	45	90	225		
P6	F	33	64	179		
P7	M	25	78	223		
P8	M	66	34	124		
P9	M	74	98	111		
P10	F	34	200	211		
P11	F	39	188	203		
P12	F	61	78	168		
P13	M	44	84	200		
P14	M	54	98	134.4		
P15	F	50	69	209.2		
P16	M	57	90	143		
P17	F	20	36	200		

P18	F	23	88	188
P19	M	34	81	225
P20	F	50	189	159

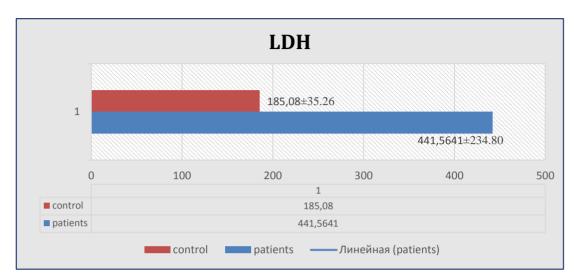
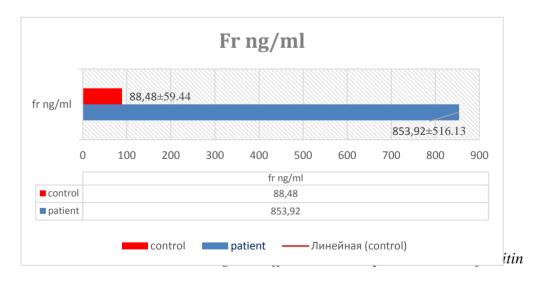


Figure 5 effect CO-19 on LDH

This figure shows the effect of Covid 19 on LDH, and through the work of statistical analysis, find that the standard deviation of the LDH enzyme faces high levels and deviates from its normal levels, where the ratio reaches 441.5641 ± 234.80 , where this value represents very high levels, as a comparison was made in Figure 1 between an enzyme LDH among patients and control, where the values of healthy people represent the normal for the enzyme, and this is due to several reasons, including the level of the enzyme "LDH", which is associated with tissue breakdown, and the level of "C-CRP", which is a protein produced during inflammation, in addition to a decrease in a type of white blood cells Found in the blood are called lymphocytes[18]. An abnormal lack of lymphocytes (from white blood cells), in particular a low number of CD4 \pm and CD8 \pm T cells, are characteristic signs that result from disease progression, in addition to high levels of the inflammatory cytokines IL-6 and IL. 8- During treatment in severely ill patients, this is associated with a decrease in the number of lymphocytes [19].



The effect of CO-19 was clear on the human body through the effect on the ratio of ferritin present, and through the standard deviation by the statistical analysis program, it was found that the difference was clear and large between patients and control, because the effect of the disease was directed at attacking red blood cells from outside and causing the loss of their ability (The ability of hemoglobin "Hb") to bind with oxygen, and this explains the failure of some parts of the body in patients with CO-19 (such as the kidneys) due to lack of oxygen. As a result, the body responds to this lack of oxygen by increasing the production of hemoglobin "Hb" and the iron store "ferritin Red blood cells present in human blood, their function is that they carry hemoglobin, which carries oxygen to all cells and

organs of the body. And hemoglobin consists of iron and protein [20]. CO-19 attacks hemoglobin and expels iron from it, and in that case the red blood cells and hemoglobin become useless, because they cannot carry and transport oxygen to the rest of the cells and organs of the body, and damage to these organs occurs, the most important of which are the lungs, liver, kidneys and brain, and then the rest of the body cells, and the patient dies, and this Explains the severe lack of oxygen [21].

4. STATISTICAL ANALYSIS

Table 1.3 Correlation ferritin and LDH between control and patients

Correlatio								
					LDH	FR	FR	LDH
					patients	patients	control	control
Spearma n's rho LDH patient		Correlation Coefficient			1.000	.250	208	008
	patients	Sig. (2-tailed)				.287	.379	.975
		Bootstrap	Bias		.000	021	.010	.006
			Std. Error		.000	.235	.256	.261
			95% Confidence Interval	Lowe r	1.000	249	662	508
				Upper	1.000	.658	.313	.525
	FR patients	Correlation Coefficient			.250	1.000	202	191
		Sig. (2-tailed)			.287		.393	.420
		Std. 95%	Bias		021	.000	.015	.015
			Std. Error	Std. Error		.000	.211	.265
			95% Confidence Interval	Lowe r	249	1.000	559	663
				Upper	.658	1.000	.235	.391
	control	Correlation Coefficient			208	202	1.000	078
		Sig. (2-tailed)			.379	.393		.744
		Bootstrap	Bias		.010	.015	.000	.005
			Std. Error		.256	.211	.000	.238
			95% Confidence Interval	Lowe r	662	559	1.000	562
				Upper	.313	.235	1.000	.398
	LDH Correlation C		Coefficient	1	008	191	078	1.000
		Sig. (2-tailed)			.975	.420	.744	
		Bootstrap Bias			.006	.015	.005	.000
		9	Std. Error		.261	.265	.238	.000
			95% Confidence Interval	Lowe	508	663	562	1.000
				Upper	.525	.391	.398	1.000

5. DISCUSSION

The research discussed the effects of the CO-19 on the acute shortage of ferritin and DHL existing rates that a person is exposed to when infected. Through the results and statistical analysis shown in the research, we observe the acute effect on the patient through undue fatigue, headache, chronic headache, shortness of breath and may indicate The decrease in ferritin levels in the body results in iron deficiency, which is often caused by insufficient quantities after the iron is removed from hemoglobin, iron becomes free and free in the blood circulation, and this explains the increase in the level of iron (ferritin) in the blood of patients with the CO-19virus And indicated that free

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iron is very toxic and leads to oxidative damage to the lungs, and this explains the view of chest rays in patients that resemble broken glass on the lungs (bilateral ground glass opacities), and it is treated as it is pneumonia and how the kidneys excrete For a hormone that stimulates the production of red blood cells (erythropoietin), which explains the increase in the proportion of hemoglobin in patients, and the storage of excess iron in the circulation leads to an increase in liver enzymes (ALT) and as a result Due to the activity of the virus, the body's immune system tries to overcome it by increasing the production of white blood cells, especially monocytes, and this explains its increase in patients. As for why there are fewer lymphocytes in the blood (lymphopenia) in CO-19 patients, its explanation is that the body is busy producing other cells, and the reason for the lack of Infection in those who received the tuberculosis vaccine, because it stimulates the immune system Ferritin is able to activate macrophages (apocrine cells), which are a type of white blood cell in the immune system When activated, they start to secrete cytokines, this is a class of signaling molecules that mediate and regulate immunity. When excreted in low concentrations, it is safe for the body and helps protect it from viruses but when it is excreted in high concentrations, it can be fatal for half of the patients, especially for the elderly and The relatively high levels of the enzyme "LDH" play a crucial role in distinguishing the vast majority of cases that require immediate medical attention, confirming that this is consistent with current medical knowledge that high levels of LDH are associated with tissue breakdown that occurs in various diseases, including lung disorders Like pneumonia

6. CONCLUSION

Through the statistical analysis that proved the existence of an adverse relationship and a negative effect on healthy people, as for patient people, we find that the CO-19 has a positive effect on patient people and After the toxic iron ion has been widely released from all red blood cells; It spreads throughout the human body, including the lungs together, causing great harm in them because iron is a toxic ion in its free form (not associated with the pigment), and this explains that infection with the emerging "Covid 19" virus affects the lungs together, while it is rare that Pneumonia can cause infection in both.

REFERENCES

- 1. Lu, H., Stratton, C.W. and Tang, Y.W., 2020. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *Journal of medical virology*, 92(4), pp.401-402.
- 2. Gorbalenya, A.E., Baker, S.C., Baric, R., Groot, R.J.D., Drosten, C., Gulyaeva, A.A., Haagmans, B.L., Lauber, C., Leontovich, A.M., Neuman, B.W. and Penzar, D., 2020. Severe acute respiratory syndromerelated CO-19virus: The species and its viruses—a statement of the CO-19virus Study Group.
- 3. Hui, D.S., Azhar, E.I., Madani, T.A., Ntoumi, F., Kock, R., Dar, O., Ippolito, G., Mchugh, T.D., Memish, Z.A., Drosten, C. and Zumla, A., 2020. The continuing 2019-nCoV epidemic threat of novel CO-19viruses to global health—The latest 2019 novel CO-19virus outbreak in Wuhan, China. *International Journal of Infectious Diseases*, *91*, pp.264-266.
- 4. Burki, T.K., 2020. CO-19virus in China. The Lancet. Respiratory Medicine, 8(3), p.238.
- 5. World Health Organization, 2020. CO-19virus disease 2019 (COVID-19): situation report, 82.
- 6. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., Gu, X. and Cheng, Z., 2020. Clinical features of patients infected with 2019 novel CO-19virus in Wuhan, China. *The lancet*, 395(10223), pp.497-506.
- 7. Burrell, C.J., Howard, C.R. and Murphy, F.A., 2016. Fenner and White's Medical Virology. Academic Press.
- 8. Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K.S., Lau, E.H., Wong, J.Y. and Xing, X., 2020. Early transmission dynamics in Wuhan, China, of novel CO-19virus–infected pneumonia. *New England Journal of Medicine*.
- 9. Lai, C.C., Shih, T.P., Ko, W.C., Tang, H.J. and Hsueh, P.R., 2020. Severe acute respiratory syndrome CO-19virus 2 (SARS-CoV-2) and CO-19 virus disease-2019 (COVID-19): the epidemic and the challenges. *International journal of antimicrobial agents*, p.105924.
- 10. Carlos, W.G., Dela, C.C., Cao, B., Pasnick, S. and Jamil, S., 2020. Novel Wuhan (2019-nCoV) CO-19virus. *American journal of respiratory and critical care medicine*, 201(4), p.P7.
- 11. Chowell, G., Abdirizak, F., Lee, S., Lee, J., Jung, E., Nishiura, H. and Viboud, C., 2015. Transmission characteristics of MERS and SARS in the healthcare setting: a comparative study. *BMC medicine*, *13*(1), pp.1-12.
- 12. Adhikari, S.P., Meng, S., Wu, Y.J., Mao, Y.P., Ye, R.X., Wang, Q.Z., Sun, C., Sylvia, S., Rozelle, S., Raat, H. and Zhou, H., 2020. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of CO-19virus disease (COVID-19) during the early outbreak period: a scoping review. *Infectious diseases of poverty*, *9*(1), pp.1-12.
- 13. Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K.S., Lau, E.H., Wong, J.Y. and Xing, X., 2020. Early transmission dynamics in Wuhan, China, of novel CO-19virus–infected pneumonia. *New England Journal of Medicine*.

- 14. Velavan, T.P. and Meyer, C.G., 2020. The COVID- 19 epidemic. *Tropical medicine & international health*, 25(3), p.278.
- 15. Rothan, H.A. and Byrareddy, S.N., 2020. The epidemiology and pathogenesis of CO-19virus disease (COVID-19) outbreak. *Journal of autoimmunity*, p.102433.
- 16. Wang, W., Tang, J. and Wei, F., 2020. Updated understanding of the outbreak of 2019 novel CO-19virus (2019- nCoV) in Wuhan, China. *Journal of medical virology*, 92(4), pp.441-447.
- 17. Ronni, T., Matikainen, S., Sareneva, T., Melen, K., Pirhonen, J., Keskinen, P. and Julkunen, I., 1997. Regulation of IFN-alpha/beta, MxA, 2', 5'-oligoadenylate synthetase, and HLA gene expression in influenza A-infected human lung epithelial cells. *The Journal of Immunology*, 158(5), pp.2363-2374.
- 18. Winkle, D.C., Clague, A.E. and Gardiner, R.A., 1988. ELNATED LACTATE DEHYDROGENASE ISOENZYME I AS A TUMOUR MARKER IN PATIENTS WITH GERM CELL TESTICULAR TUMOURS. *Australian and New Zealand Journal of Surgery*, 58(9), pp.737-741.
- Schneider, R.J., Seibert, K., Passe, S., Little, C., Gee, T., Lee III, B.J., Miké, V. and Young, C.W., 1980.
 Prognostic significance of serum lactate dehydrogenase in malignant lymphoma. *Cancer*, 46(1), pp.139-143.
- 20. Rambotti, P. and Davis, S., 1981. Lactic dehydrogenase in normal and leukemia lymphocyte subpopulations: evidence for the presence of abnormal T cells and B cells in chronic lymphocytic leukemia.
- 21. Pan, L., Beverley, P.C., Bobrow, L.G., Swallow, D.M. and Isaacson, P.G., 1989. Production of monoclonal antibodies to lactate dehydrogenase (LDH) isoenzymes for immunohistochemical study on fixed tissue section. *The Histochemical Journal*, 21(11), pp.638-644.